TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2306 : ENGINEERING SURVEY III

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
-Drawing instruments.
This paper consists of five questions.
Attempt any THREE questions.
Do not write on the question paper.

Question ONE (Compulsory) 30 Marks

a). With an aid of a sketch, derive the main elements of a simple curve. Two straights AI and BI are to be joined by a circular curve of 300 m radius. The intersection angle was provided as 20^0C and the chainage of the intersection point I was 678.432 m from A as the origin. Determine the data required for setting out of the curve **(20 Marks).**

b). The coordinates (E, N) of corners of a polygonal area namely A, B, C, D, E, F and G were given as follows: A (0,0), B (-32, 40), C (-41,126), D (14,200), E (80,144), F (108,62), and G (27, -19) returning back to A. If the steel band used during the measurements was found to be 0.1 m too short, determine the corrected area of the polygon to the nearest hectares **(5 Marks).**

c). Calculate the side widths and cross – sectional area of an embankment to a road with formation width of 12.50 m, and side slopes 1 vertical to 2 horizontal, when the centre height is 3.10 m, and the existing ground has a cross fall of 1 in 12 at right angles to the centre line of the embankment **(5 Marks).**

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

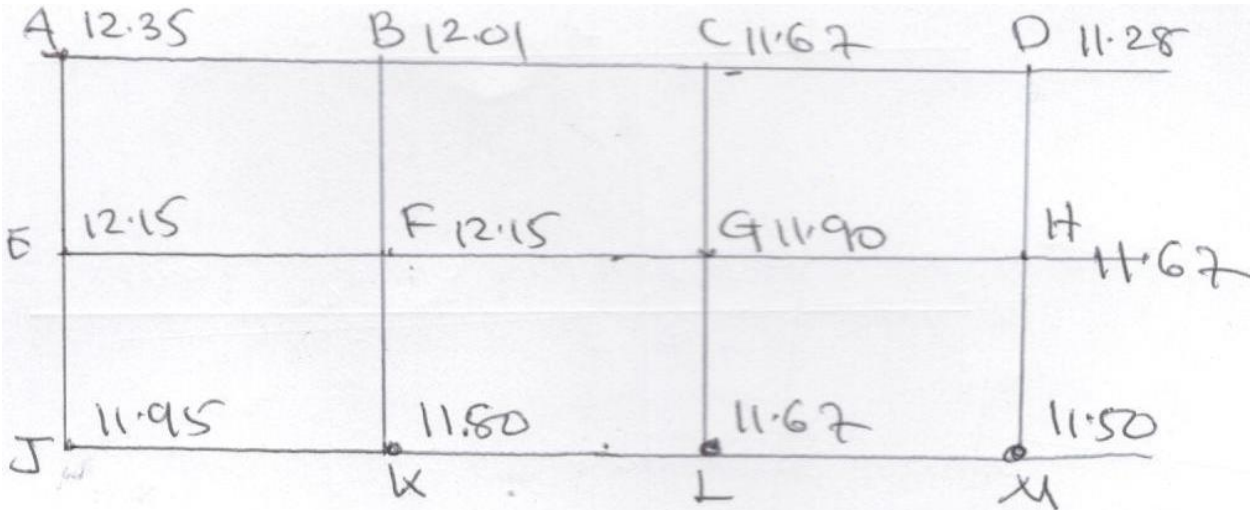
Question TWO (20 Marks)

a). State Simpson's rule. In a chain survey, the following offsets were taken to a fence from the chain line.

Chainage (m):	0	30	60	90	120	150	180	210	240	270
Offsets :	0	6.49	10.04	11.14	10.53	12.50	19.75	4.57	18.30	0

(4 Marks).

b). The diagram below shows the existing ground level of a 15-m square grid forming part of a site which is to be excavated to a uniform formation level of 10 m above the datum. Calculate the volume of the earth that will be excavated by assuming that the area is to be sub-divided into rectangles and triangles respectively **(16 Marks).**



c). The area within the underwater contour lines of a lake were provided as follows:

Contour (m AOD):	190	188	186	184	182
Area (m^2):	3150	2460	1630	840	210

Determine the volume of water in the lake between the 182 and 190 contours **(4 Marks).**

Question THREE (20 Marks)

a). Tabulate data needed to set out a simple circular using a chain and theodolite. The radius of the curve is given as **600** m connecting two straight deflecting at an angle of $18^0 24'$ and the chainage of intersection **I** is **2140** m (Use standard chord length of 20 m) **(14 Marks).**

c). A road has a formation breadth of 10 m, and side slopes of 1 in 1 cut and 1 in 3 fills. The original ground had a cross – fall of 1 in 5. If the depth of excavation at the Centre lines of

two sections 25 m apart are 0.8 and 1.2 m respectively, determine the volume of cut and fill over this length **(6 Marks).**

Question FOUR (20 Marks)

a). Discuss the basic parts of a planimeter. Determine the area of a piece of land which has an area of 1700 mm^2 as measured using a fixed – arm planimeter given the scale of the plan as 1: 25000 **(10 Marks).**

b). Derive the data required to set out a kerbline of radius 12 m and the angle of deflection is 90^0, the offsets were required at an interval of 2 m **(10 Marks).**

Question FIVE (20 Marks)

a). Define the following terms as used in earth works:

i). Mass Haul Diagrams
ii). Bulking
iii). Free Haul Distance
iv). Overhaul Volume
v). Haul Distance **(10 Marks).**

b). A cutting is to be made in the ground which has a traverse slope of 1:7, the width of the formation is 10 m and the side slope of 1 vertical to 2 horizontal. If the depths of the Centre lines of the three sections of 20 m apart are 2.5, 3.10 and 4.30 m respectively, determine the volume of the earth over the entire length **(10 Marks).**